8.5 NOISE

South Star Cogeneration LLC is seeking approval from the CEC to construct and operate the South Star Cogeneration Project (South Star) in western Kern County approximately 35 miles southwest of Bakersfield, California. The South Star Project will consist of two substantially identical cogeneration plants, South Star I (Section 17, T32S, R23E) and South Star II (Section 7, T32S, R23E), that are located approximately 1.5 miles apart on contiguous Texaco California Inc. (TCI) property in the South Midway-Sunset Oilfield. The Application for Certification (AFC) presents an evaluation of the entire South Star Project in a manner to clearly indicate the environmental affects associated with each site and its related linear facilities.

South Star I includes the following project components shown on Figure 2-1:

- South Star I site;
- Replacement of poles and conductor for approximately 4.7 miles of existing 12.47 kV transmission line;
- 0.6 mile 115 kV transmission line extension to South Star I site;
- Alternative stand-alone 5.3 mile 115 kV transmission line;
- 3.6 miles of natural gas line (Kern-Mojave to Station 109 and natural gas line placed within TCI South Midway Utility Corridor Segment A);
- Approximately 2.4 mile Alternative Route 1 natural gas line; and
- Improved access road (Midoil Road to South Star I site).

South Star II includes the following project components as shown on Figure 2-1:

- South Star II site;
- 3.8 mile addition of second 115 kV circuit on proposed South Star I transmission line;
- 1.4 miles of natural gas line (placed within TCI South Midway Utility Corridor Segment B);
- Alternative aboveground Route 2 natural gas line; and
- Improved access road (Midoil Road to South Star II site).

The potential noise impacts have been evaluated for the South Star I and South Star II Project. With the incorporation of the Conditions of Certification for the proposed

project, the impacts to noise would be insignificant. This section presents an assessment of potential noise impacts related to the construction and operation of each of the South Star I and South Star II Project sites. The following subsections identify the applicable laws, ordinances, regulations, and standards (LORS), describe the affected environment, and discuss potential environmental consequences, and mitigation measures.

8.5.1 Applicable Laws, Ordinances, Regulations, and Standards

Laws, Ordinances, Regulations, and Standards (LORS)

Table 8.5-1 summarizes the applicable laws, ordinances, regulations, and standards. Each is discussed below.

Federal

There are no federal laws governing offsite (community) noise. Under the Occupational Safety and Health Act of 1970 (29 USC § 651 et seq.), the Department of Labor, Occupational Safety and Health Administration (OSHA) has adopted regulations (29 CFR § 1910.95) that establish maximum noise levels to which workers at a facility may be exposed. These OSHA noise regulations are designed to protect workers against the effects of noise exposure, and list permissible noise level exposure as a function of the time during which the worker is exposed. Additionally, OSHA regulations dictate hearing conservation program requirements and workplace noise monitoring requirements.

State

There are no state regulations that set a numerical limit on offsite (community) noise. Rather, state planning law (Gov. Code, § 65300) requires that all counties and cities prepare and adopt a General Plan. Government Code section 65302(f) requires that a noise element be prepared as part of the General Plan. Other state LORS include the California Environmental Quality Act (CEQA) and the California Occupational Safety and Health Act (Cal-OSHA). As a result of the passage of Cal-OSHA the California Occupational Safety and Health Administration (Cal-OSHA) has promulgated Occupational Noise Exposure Regulations (Cal. Code Regs., tit. 8, § 5095 et seq.) that set employee noise exposure limits. These standards are equivalent to the federal OSHA standards described above.

CEQA. CEQA requires that significant environmental impacts be identified, and that such impacts be eliminated or mitigated to the extent feasible. The applicable CEQA Guidelines (Cal. Code Regs., title 14, §15000 et seq., Appendix G §XI) explain that a significant effect from noise may exist if a project would result in:

- Exposure of persons to, or generation of, noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.
- Exposure of persons to, or generation of, excessive ground vibration or ground-borne noise levels.
- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

LOCAL

Kern County. In the Noise Element to the General Plan, Kern County established environmental noise limits based on the land use of the property receiving the noise. The permissible noise levels are outlined in Table 8.5-1.

8.5.2 Affected Environment

8.5.2.1 Proposed South Star I and II Sites and Vicinity

The proposed South Star I and II sites will be located within the Midway-Sunset Oilfield south of Fellows and west-northwest of Taft. South Star I is located approximately 2.0 miles from the nearest noise-sensitive receptor, in Taft. The line-of-site between the South Star I site and Taft is broken by numerous hills. The nearest noise-sensitive receptors in Taft include residences, a school, and a church.

South Star II is located approximately 1.1 miles from the nearest noise-sensitive land use, in Fellows. The line-of-sight between the South Star II site and Fellows is broken by numerous hills. Noise-sensitive receptors in Fellows include residences, a school (Midway Elementary School), and a park.

8.5.2.2 Ambient Noise Survey

In order to evaluate current conditions and assess potential project noise impacts on the surrounding communities, an ambient sound level survey was conducted on June 11 and 12, 2001. The noise survey was conducted at each of the proposed South Star I and II plant sites and at selected offsite locations as shown in Figure 8.5-1. These offsite locations represent the nearest noise-sensitive receptors (consisting of residential, recreational and schools) to the proposed South Star I and II Project sites.

Methods. Unattended long-term (25 hours in duration) and attended short-term (15 minutes in duration) noise measurements were conducted. The long-term measurements were made with Type 2, Metrosonics db308 and db311 community noise analyzers. The short-term measurements were made with a tripod-mounted Type 1 Brüel & Kjær Type 2231 sound level meter (SLM) with statistical analyzer. The sound measuring instruments used for the survey were set on slow time response using the A-weighted decibel (dBA) scale for all of the noise measurements. To ensure accuracy, the laboratory calibration of the instruments was field checked before and after each measurement period using an acoustical calibrator. The accuracy of the acoustical calibrator is maintained through a program established by the manufacturer, and is traceable to the National Institute of Standards and Technology. The sound measurement instruments meet the requirements of the American National Standard S 1.4-1983 and the International Electrotechnical Commission Publications 804 and 651. In all cases, the microphone height was five feet above the ground and the microphone was equipped with a windscreen.

Results. The results of the noise measurements are summarized in Table 8.5-2. Two long-term noise measurements were conducted. The monitoring location designated Long-Term 1 (LT-1) was adjacent to a residential area in Taft. LT-2 was located on the site of the proposed South Star II project. The hourly daytime noise levels at LT-1 varied from 38 dBA L_{50} to 42 dBA L_{50} (35 dBA L_{90} to 39 dBA L_{90}). Nighttime hourly noise levels at LT-1 varied from 34 dBA L_{50} to 40 dBA L_{50} (32 dBA L_{90} to 38 dBA L_{90}). Daytime hourly noise levels at LT-2 varied from 44 dBA L_{50} to 59 dBA L_{50} (42 dBA L_{90} to 56 dBA L_{90}). Nighttime hourly noise levels at LT-2 varied from 44 dBA L_{50} to 56 dBA L_{50} (43 dBA L_{90} to 54 dBA

L_{90}). The long-term noise measurement data are summarized in Table 8.5-2. The hourly L_{eq}, $L_{90,}$ and L_{50} sound levels measured at LT-1 and LT-2 are contained in Appendix L.

Seven short-term noise measurements (ST-1 through ST-7) were conducted concurrently with the long-term noise measurements. The short-term noise measurement data are summarized in Table 8.5-3. The short-term noise measurements were conducted at selected locations in the surrounding community to represent noise sensitive receptors. Additionally, one short-term noise measurement (ST-1) was conducted on the proposed South Star II site. The noise measurement locations, short-term and long-term, are shown on Figure 8.5.-1. The ambient noise levels taken by the short-term noise measurements varied from 35 dBA L_{50} (34 dBA L_{90}) at a residence on Hilltop Street in Taft, to 48 dBA L_{50} (41 dBA L_{90}) at Fellows Park. Typical ambient noise sources at off-site locations included industrial facilities, vehicular traffic, aircraft noise, distant landscaping equipment noise, and barking dogs.

Weather conditions during the survey period were mild to warm with clear skies and light breezes. Air temperatures varied from 77 °F to 87 °F, with 19 percent to 37 percent relative humidity. Winds varied from 0 to 5 miles per hour, generally from the southwest. These weather conditions are ideal for conducting noise measurements and thus there was no adverse effect on the measurements due to the weather.

8.5.2.3 Recommended A-Weighted Sound Level Design Goals

The South Star I and II Project sites are within the County of Kern. The Kern County Noise Element has been reviewed and the portions relevant to this project are summarized in Table 8.5-1, Noise Laws, Ordinances, Regulations, and Standards.

Land use in the vicinity of the site is industrial for a minimum distance of 1.1 mile in all directions, and is operated by TCI and other oilfield operators. Pursuant to the Kern County Noise Element, industrial land use is considered noise-insensitive. The nearest noise-sensitive receptor from South Star I is located in Taft, approximately 10,560 feet away. The nearest noise-sensitive land use from South Star II is located in Fellows, approximately 5,600 feet away. Pursuant to the Kern County Noise Element, the nearest noise-sensitive land use (Midway Elementary School in Fellows) is considered highly sensitive, with a maximum

desired daytime ambient noise level of 50 dBA L_{50}, and a maximum desired nighttime ambient noise level of 40 dBA L_{50}.

The CEC regulations regarding noise, new-source noise impacts at residential/recreational receptors are evaluated with respect to the increase over pre-existing background noise levels. The CEC defines the area potentially impacted by the project as that area where there will be an increase above existing ambient noise levels of five dBA or more during either construction or operation.

The minimum hourly L_{90} measured at LT-1 was 32 dBA. The nearest noise-sensitive receptors to South Star I are the residences at ST-4 although they are only 750 feet closer than location LT-1. It can be assumed that this area has similar noise levels as those at LT-1. Thus, the CEC impact criteria would be 37 dBA (32 dBA L_{90} plus five dBA) at the nearest residence, 10,560 feet away from the South Star I plant's nominal acoustical center. This corresponds to a plant contribution of 35 dBA at the nearest noise-sensitive receptor to South Star I.

At South Star II, the nearest noise-sensitive receptor is located 5,600 feet from the power plant's nominal acoustical center. It is assumed that the existing nighttime sound levels at the nearest noise-sensitive receptor to South Star II are similar to the low level of 32 dBA L_{90} at LT-1. Thus, the CEC impact criteria for South Star II would also be a cumulative level of 37 dBA at the nearest noise-sensitive receptor. The contribution from the South Star II plant must not exceed 35 dBA at 5,600 feet away.

8.5.3 Environmental Consequences

This section summarizes the modeled noise levels at the nearest noise-sensitive land uses in Fellows and Taft resulting from the proposed project. The modeled noise levels are compared with existing conditions to determine the noise impact of the project.

8.5.3.1 Modeled Operational Noise

Noise levels due to operation of South Star I and II were modeled based on the list of major equipment planned for each of the facilities. These items, and their associated octave-band sound pressure levels at a distance of 400 feet are listed in Table 8.5-4. These

noise data are measured or estimated noise levels (as supplied by the project engineers) without noise control measures.

A spreadsheet model was used to estimate the impacts of the proposed equipment operation. The data provided in Table 8.5-4 was converted into sound power levels for the analysis. The major pieces of equipment listed were assumed to operate continuously for the purposes of the modeling. Those items operating less than three hours per week were not included in the modeling. Attenuation due to hemispherical wave divergence and standard atmospheric absorption (70% relative humidity, 15°C) was modeled. Attenuation due to wind, or temperature gradients was not added to the model, but a 5 dBA attenuation due to terrain shielding and due to vegetation were accounted for in this modeling (Beranek, 1971 and Harris, 1991). The spreadsheet analysis is contained in Appendix L.

Table 8.5-5 presents the maximum sound levels predicted from the modeling for each receptor site. In addition, the maximum cumulative impact for the sensitive receptors is also presented.

Compared with the ambient noise levels measured at Fellows and Taft, noise from operation of South Star I and II would be inaudible during daytime hours. Additionally, based upon the estimated levels, no prominent tonal noise emissions would be audible.

The L_{50} South Star I and II noise level at the nearest residences in Taft is estimated to be 17 dBA. The cumulative impact at the nearest residences in Taft is calculated to have no effect on the nighttime L_{50} or L_{90}. The minimum nighttime L_{90} measured at Site LT-1 was 32 dBA. Addition of the South Star I and II L_{90} predicted by the modeling to the minimum nighttime L_{90} at the nearest residences produces no change.

The cumulative impact in Fellows of the maximum noise levels from the South Star II project (31 dBA) does not exceed the Kern County limit of 40 dBA for a nighttime L_{50} for highly sensitive land uses. It is assumed that the nighttime sound levels in Fellows are similar to those at LT-1. With the addition of South Star I and II L_{90} predicted by the modeling, the nighttime L_{90} at the nearest noise-sensitive receptor in Fellows would increase from 32 dBA to 35 dBA L_{90}. No noise sensitive receptors are located within the area around

each South Star site that could increase in noise level by 5 dBA. The operational noise levels of South Star I and II have no impact on surrounding sensitive receptors. Thus, no noise mitigation measures are necessary.

Although South Star I and II operational noise levels are not expected to have an impact on noise-sensitive receptors in the area, the near-field data indicate that noise levels within the project sites would average above 80 dBA (within 100 feet). These high noise levels could exceed federal Occupational Safety and Health Act (OSHA) and California Occupational Safety and Health Association (Cal-OSHA) guidelines for worker noise exposure. Compliance with Cal-OSHA regulations will ensure that personnel are adequately protected from potential noise hazards. The noise exposure level to protect hearing of workers is regulated at 90 dBA over an 8-hour work shift. Areas above 85 dBA will be posted as high noise level areas and hearing protection will be required. South Star I and II will implement a hearing conservation program for applicable employees as outlined in Cal-OSHA regulations.

No significant noise impacts are expected from operation and maintenance of the transmission line and utility corridor. The proposed linear routes are at least one mile from noise-sensitive receptors throughout the routes.

8.5.3.2 Modeled Construction Noise

Construction of South Star I is expected to proceed for approximately 8 months before commercial operation of two of the four units in June 2002. Commercial operation of the other two units at South Star I would follow approximately 7 months later in January 2003. The construction schedule for South Star II would be similar in terms of overall duration and spacing of interim milestones. Construction is planned to occur between the hours of 6 a.m. and 6 p.m., Monday through Saturday. Additional hours may be necessary to make up schedule deficiencies or to complete critical construction activities.

Many construction activities will be taking place, including construction of foundations, installation of major piping and equipment, connection of major site interfaces, erection of major structures, and startup/testing. During these activities a varying number of pieces of construction equipment and personnel will be on site, resulting in varying levels of

construction noise. An extensive field study was conducted by Bolt, Beranek, and Newman on various types of construction projects including industrial projects. These study data were used to develop Table 8.5-6.

As Table 8.5-6 shows, the loudest phase of the construction effort is expected to occur during finishing. The average noise level during finishing, with all pertinent equipment operating, is estimated to be approximately 89 dBA at a distance of 50 feet. Accounting for the attenuation of sound with distance, terrain shielding, and excess attenuation, the equipment noise would be reduced to a noise level of 37 dBA at the nearest noise-sensitive receptor in Fellows, 5,600 feet from the construction activity of South Star II. These noise levels would be eight decibels lower than the measured daytime ambient noise level at ST-7 (the nearest receptor). Thus, pursuant to the CEC standard, the nearest noise-sensitive receptor to the South Star II, and also the nearest noise-sensitive receptors to South Star I, would not be impacted by the project (increase of five dBA or more) during construction.

8.5.3.3 Cumulative Noise Impacts

The Elk Hills, Midway-Sunset, and Sunrise projects are all too far from either South Star site for South Star to cause any perceptible cumulative impact. Therefore, no cumulative noise impacts from either construction or operations are anticipated as a result of the South Star Project.

8.5.4 Mitigation Measures

It has been found that there will be no operational, construction, or cumulative noise impacts at sensitive receptors due to the South Star project. Consequently, no noise mitigation measures are required.

8.5.5 Involved Agencies and Agency Contacts

Agency	Contact	Telephone
Kern County Planning Department 2700 “M” Street Bakersfield, CA 93301	Mr. Glenn Banill	(661) 868-8606
City of Taft	Ms. Norma Robinson	(661) 763-1222

8.5.6 Permits Required and Permit Schedule

No noise-specific permits are required for the South Star project.

8.5.7 References

American National Standard S 1.4-1983.

Beranek, L.L. and I.L. Ver, eds. 1992. *Noise and Vibration Control Engineering*. John Wiley & Sons, Inc. New York, NY.

California Energy Commission. 1997. Rules of Practice and Procedure, Power Plant Site Certification Regulations.

California Occupational Safety and Health Association (Cal/OSHA) Guidelines for Worker Noise Exposure.

EEI. 1983. Electric Power Plant Environmental Noise Guide, 2nd Edition, Revised.

Harris, Cyril M. 1979. Handbook of Noise Control, 2nd Edition, McGraw-Hill, Inc. , New York.

International Electrotechnical Commission Publications 804 and 651.

Kern County General Plan Noise Element, 1989.

Occupational Safety and Health Act (OSHA) Guidelines for Worker Noise Exposure

San Luis Obispo General Plan, County of, - Noise Element Part 1, Policy Document, 1992

U.S. Environmental Protection Agency (USEPA), 1971, Noise from Construction Equipment and Operations, Building Equipment and Home Appliances. (Prepared under contract by Bolt, et.al., Bolt, Beranek & Newman, Boston, MA). Washington, DC.

Table 8.5-1. Noise Laws, Ordinances, Regulations, and Standards

Law, Ordinance, Regulation, or Standard				Applicability	AFC Conformance Section
U.S. EPA, Ambient Noise Guideline of 55 dBA (L_{dn})				Guidance for state and local government	Not Applicable
Cal/OSHA Permissible Exposure Limit of 90 dBA (8-hr. average)				All employees on site during construction and operation of project	Sections 8.5.4.1 and 8.5.4.2
Kern County General Plan Noise Element Ambient Noise Limits (in dBA) by Land Use Category (Sensitivity to Noise):				Applies to receptors affected by facility noise	Sections 8.5.3.1 and 8.5.3.2
Category	**L_{50} (day)**	**L_{50} (night)**	**L_{dn}**		
Insensitive	65	60	75	Industrial uses, oil fields	Sections 8.5.4.1 and 8.5.4.2
Moderately sensitive	60	55	70	Not applicable	
Sensitive	55	45	65	Residential	Sections 8.5.3.1 and 8.5.3.2
Highly sensitive	50	40	60	Rural residential	Sections 8.5.3.1 and 8.5.3.2

Table 8.5-2: Long-Term Noise Measurement Data Summary

Site ID	Measurement Date	Location	25 hr L_{eq} (dBA)	24 hr L_{dn} (dBA)	24 hr CNEL (dBA)	25 hr Average L_{50} (dBA)	25 hr Average L_{90} (dBA)
LT-1	6/11/01-6/12/01	Adjacent to 409 Terrace Drive, Taft	45	49	50	39	36
LT-2	6/11/01-6/12/01	East Corner, South Star II Site	60	64	64	52	49

Table 8.5-3. Short-Term Noise Measurement Data Summary (June 11-12, 2001)

		Measurement Period				Measurement Results, dBA					
Site ID	Measurement Location	Date	Start Time	Duration (minutes)	Noise Sources	L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}
ST-1	NW corner of South Star I site.	6/11/01	16:45	15	Distant pump, drill rig noise	39	55	34	36	38	42
ST-2	A Street Park (Taft Heights), at baseball diamond. Park View school across street.	6/12/01	9:20	15	Distant traffic, distant landscaping noise, distant dog barking	46	58	39	41	44	49
ST-3	Front yard area of 505 Hilltop Street (Taft Heights)	6/12/01	10:10	15	Distant dogs barking, distant birds chirping, distant power tool noise, low hum from power lines.	37	50	33	34	35	39
ST-4	Front gate of 585 Kristen Way (Taft)	6/12/01	11:10	15	Distant industrial noises, distant aircraft, distant rooster crowing, leaves rustling	42	58	35	37	41	45
ST-5	Adjacent to scattered residences (Fellows), off Midoil Road. Site is northeast of Midway School.	6/12/01	11:40	15	Leaves rustling, birds chirping, distant traffic	45	62	34	37	40	47
ST-6	Fellows Park, on grassy area, adjacent to picnic tables	6/12/01	12:05	15	Distant park users, eating lunch, distant traffic, leaves rustling	54	68	35	41	48	58
ST-7	Midway Elementary School (Fellows),(south side of school overlooking oil fields)	6/12/01	13:50	15	Nearby sprinklers, birds chirping, HVAC noise, distant people talking	45	57	40	42	44	47

Table 8.5-4. Proposed Facility Operating Equipment Modeled (per site)

	Decibels at 400 feet								
Proposed New Noise Sources	**31.5 Hz**	**63 Hz**	**125 Hz**	**250 Hz**	**500 Hz**	**1,000 Hz**	**2,000 Hz**	**4,000 Hz**	**8,000 Hz**
Combustion Turbine Generator Package (4)	66	67	62	61	60	60	58	54	52
Combustion Turbine Cooling Water Skid (4)	63	65	67	68	68	68	73	63	56
Heat Recovery Steam Generator (4)	88	82	80	61	51	42	44	34	24
Heat Recovery Steam Generator Exhaust Stack (4)	77	76	77	59	49	34	30	30	32
HRSG Feed Pumps (2 of 3 operate continuously)	54	60	58	57	56	55	54	53	49
Generator Step-up Transformer (4)	50	56	58	53	53	47	42	37	30
Auxiliary Transformer (4)	47	53	55	50	50	44	39	34	30

Demineralized Water Pump	*not modeled, <90 dBA at 3 feet, operates 2-3 hrs per week
Water Wash Skid	*not modeled, <90 dBA at 3 feet, operates 30 min. per day
Wash Water Waste Transfer	*not modeled, <90 dBA at 3 feet, operates 2 hrs every 2 weeks

Table 8.5-5. Maximum Estimated Noise Levels at Sensitive Receptors

	Distance (feet)	**Existing measured daytime L_{eq} (dBA)**	**Maximum Cumulative L_{eq} (dBA)**	**Existing Nighttime L_{90} (dBA)**	**Calculated Cumulative Sound Level**	**Project Change for Lowest L_{90} (dBA)**
Nearest residences, Taft	10,560 (South Star I)	42	42	32	32	0
Midway Elementary School, Fellows	5,600 (South Star II)	45	45	32	32	0

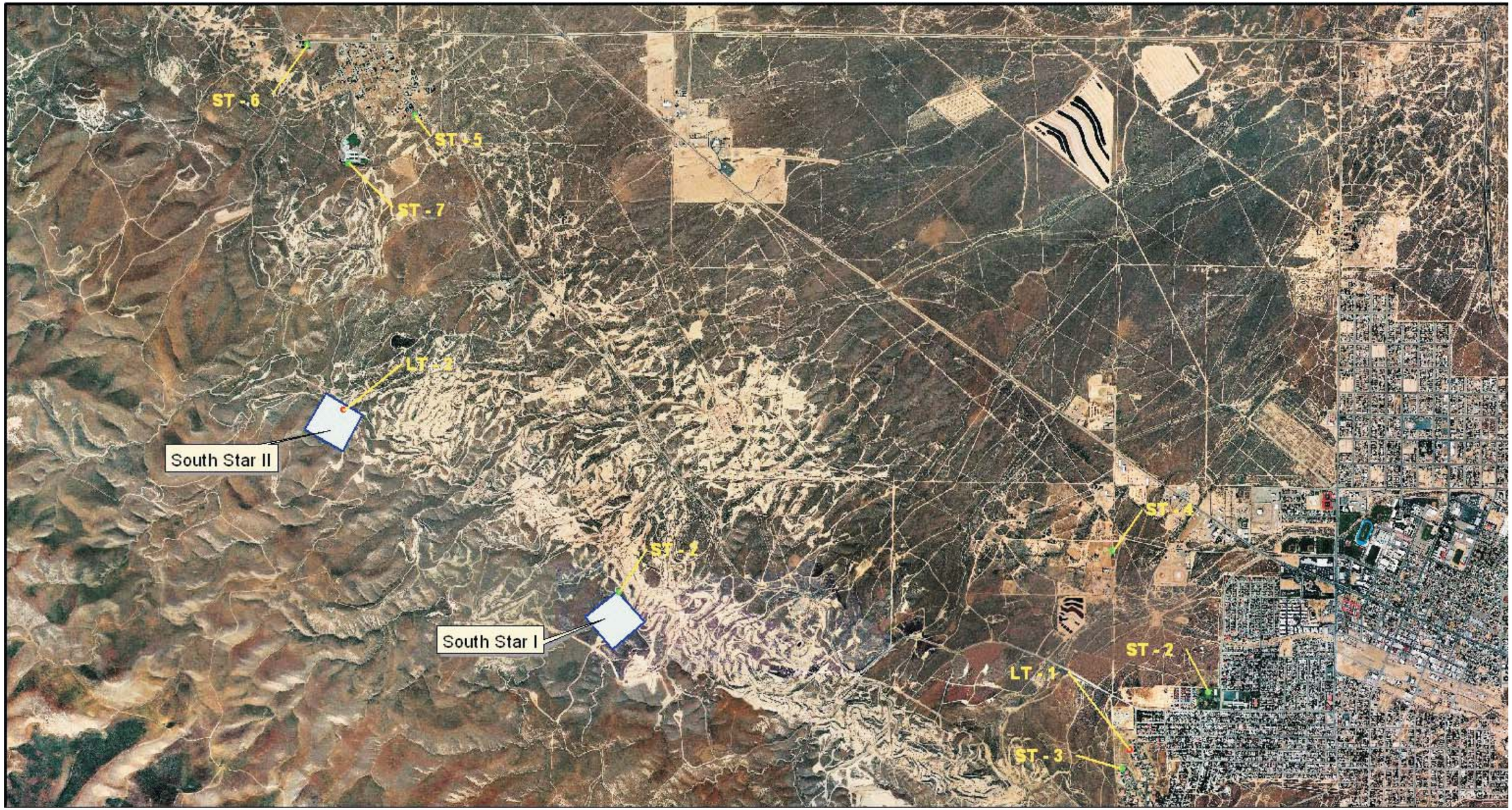
Table 8.5-6. Typical Noise Levels From Construction Activities For Industrial Projects

Construction Activity	Average Sound Level at 50 feet (dBA) [1]	Variation (dB)	Average Sound Level at 50 feet (dBA) [2]	Variation (dB)
Foundations	77	4	77	5
Erection of Major Components	84	9	84	7
Finishing	89	7	89	10

Source: Bolt, Beranek and Newman (Prepared under contract for the U.S. Environmental Protection Agency), Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances, December 31, 1971.

[1] Sound level with all pertinent equipment operating.

[2] Sound level with the minimum required equipment operating.



Proposed Power Plant Sites

LT-1 Long Term Noise Measurement Sites

ST-1 Short Term Noise Measurement Sites

N

0.5 0 0.5 1 Miles

URS

Project No. 51-00167034.00

South Star Cogeneration Project

NOISE MEASUREMENT LOCATIONS

Figure 8.5-1